SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

PRELIMINARY DRAFT STAFF REPORT FOR

PROPOSED AMENDED RULE 1173–CONTROL OF VOLATILE ORGANIC COMPOUND LEAKS AND RELEASES FROM COMPONENTS AT PETROLEUM FACILITIES AND CHEMICAL PLANTS

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Rule 1173 reduces volatile organic compound (VOC) leaks from the following for components in light liquid/gas/vapor and heavy liquid service: valves, fittings, pumps, compressors, pressure relief devices (PRDs), diaphragms, hatches, sight-glasses and meters. Facilities subject to the rule are refineries, chemical plants, oil and gas production fields, natural gas processing plants, and pipeline transfer stations. This proposed amendment adds facilities engaged in the blending, compounding and re-refining of lubricating oils and greases and marine terminals to further reduce VOC leaks. In addition, Rule 1173 also requires facilities subject to the rule to notify the AQMD of PRD releases and requires monitoring of atmospheric PRDs installed on process equipment.

After the December 2002 amendment, the AQMD established a PRD release notification program. As a result of several releases in the first year of the notification program, staff has investigated the causes of the releases to determine if rule amendments were appropriate for further control of PRD releases. For releases that were each in excess of five hundred pounds, the AQMD received notifications for eight in 2003, three in 2004, none in 2005 and four in 2006. Although staff will continue to monitor the situation, amendments to further regulate VOC releases is not recommended at this time. However, during the investigation, staff discovered that technology has developed for more effective monitoring and recording the magnitude and duration of releases in a cost effective manner. Therefore, staff is proposing amendments to require improved monitoring of all atmospheric PRDs. In addition, other parts of the rule are being clarified.

The following are highlights of the proposed amendments:

- Require facilities that re-refine lubricating oils and greases and marine terminals to implement a leak detection and repair (LDAR) program.

- Require petroleum facilities to install electronic monitoring devices on their atmospheric process PRDs to improve monitoring and quantification of future potential releases.

- Require refineries, marine terminals and lubricating oil and grease re-refiners to submit a new or revised compliance plan, identifying the atmospheric process PRD inventory and the monitoring method option selected.

- Require lubricating oil and grease re-refiners to notify the AQMD of any atmospheric PRD releases exceeding the reportable quantity limits as stipulated in 40 CFR, Part 117, Part 302 and Part 355 including any atmospheric releases exceeding 100 pounds of VOC.

- Clarify that quarterly monitoring reports are required for all atmospheric process PRDs.

The emission reductions associated with the implementation of heavy and light liquid LDAR program at lubricating oils and grease re-refiners and marine terminals are estimated to be 0.4 tons per day VOC based on the 2003 AQMP inventory.

The cost effectiveness of the proposed amendments for heavy liquid and light liquid components LDAR was calculated at $779 per ton of VOC reduced.

VOC emissions from PRD releases for 2003 through 2006 have ranged from 89 to 0.04 tons per year. Although an emission reduction has not been quantified for the improved monitoring, it is expected that the improved monitoring will ultimately result in reduced VOC emissions from PRD leaks and fewer PRD releases. The cost for the proposed improved monitoring is $2.8 million.

BACKGROUND

Rule 1173 was originally adopted on July 7, 1989 and subsequently amended on several occasions. The original intent of the rule was to control fugitive VOC leaks from light liquid/gas valves, fittings, pumps, compressors, PRDs, hatches, meters, diaphragms, and sight-glasses at refineries, chemical plants, oil and gas production sites, natural gas processing plants, and pipeline transfer stations.

The most recent amendment on December 2, 2002, required monitoring and reporting of releases from atmospheric process PRDs, and control of PRDs that release significant amounts of VOCs or payment of a mitigation fee. The mitigation fees paid to the AQMD are to be used for air quality improvement projects in the area impacted by the release. This amendment also required facilities to control fugitive VOC leaks from heavy liquid components.

The December 2002 rule required refineries to produce a PRD inventory and enhance monitoring by either equipping 20 percent of their atmospheric PRDs with tamper proof electronic monitoring devices by next turnaround starting in 2004, or use electronic process control instrumentation by July 2004. One refinery chose to install electronic monitors and all the others chose to monitor process parameters (temperature and/or pressure) or utilize telltale indicators where process monitoring was infeasible. The rule also requires that specific action be taken for releases in excess of specific amounts. For all releases greater than 500 pounds of VOCs, the refinery has to perform a failure analysis within 30 days of each release. Also, in the event of a second release in excess of 500 pounds of VOCs from the same equipment within any five year period or any one release that exceeds 2,000 pounds of VOC from a process unit requires that the company connect all PRDs from that unit to vapor recovery or control equipment. The rule also has a provision which allows the refinery to elect to pay $350,000 for each release in lieu of connecting to vapor recovery or control, provided the refinery notifies the AQMD within 90 days of the date of the release.

The Resolution of the Governing Board adopting PAR 1173 (December 6, 2002) directed staff to provide periodic updates on PRD releases to appropriate Board Committees. On April 23, 2004, staff provided to the Stationary Source Committee a summary of the atmospheric PRD releases from process equipment to date and indicated based on the reported releases in 2003 that five releases had exceeded 2,000 pounds. Two of these releases occurred at the BP West Coast Products refinery in Carson and another three occurred at the Equilon Enterprises (Shell Oil Company) refinery in Wilmington. Board members expressed concerns about the frequency and amount of emissions from PRDs (i.e. about 89 tons of VOCs in 2003). They indicated that staff should analyze the data gathered to decide whether or not further amendments to Rule 1173 should be recommended. One of the concerns expressed was that during the rule development and hearing in 2002, the refineries stated that large VOC releases from atmospheric PRDs were extremely rare. However, if the releases in 2003 were an indication of normal activity, perhaps other options for controlling emissions from atmospheric PRDs should be considered.

Since the end of 2002, there have been nine atmospheric PRD releases that emitted between 500 and 2,000 pounds and eight releases greater than 2,000 pounds VOC, including one release that was categorized as exempt due to a Southern California Edison power outage. The total amount of VOCs released from atmospheric process PRDs have decreased from 2003 to 2005. Releases

ranged from 89 tons in 2003, 4 tons in 2004 to less than 0.5 ton in 2005. However, these releases continued to be random with an increase in PRD releases reported in 2006. One refinery had four releases ranging from 713 pounds to over 11,000 pounds for a total of slightly more than 7.5 tons during 2006. It should be noted that in some cases refineries have taken actions to minimize potential PRD releases in the future by voluntarily connecting PRDs to vapor recovery systems, as well as implementing operational procedures.

Staff has evaluated the data from atmospheric PRD releases and emissions reported to the AQMD from 2003 through 2006 and concluded that amendments to require further control of atmospheric PRDs are not necessary at this time. However, staff has determined that PRD monitoring can be significantly enhanced by taking advantage of recent advancements in the wireless electronic monitoring technology and decided to proceed with a rulemaking process to amend Rule 1173 to require enhanced PRD monitoring on all atmospheric process PRDs. Staff will continue to monitor PRD release activity and recommend additional control if the situation changes.

Recent advances in wireless electronic monitoring are significant. Wireless monitors will enable real-time monitoring of atmospheric PRDs and can be used anywhere within a facility. Currently, there are facilities that have atmospheric PRDs which are equipped with telltale indicators consisting of "socks" and similar type devices. With wireless monitors in place, a facility operator will be able to continuously monitor PRDs, accurately measure pressure and the time span for releases and thereby allowing for effective quantification of releases. In addition, this data can be incorporated into a facility's existing data collection system without much added cost.

The costs associated with installing, maintaining, troubleshooting and upgrading wiring have escalated while the costs of wireless technology have continued to drop, particularly in areas of installation and maintenance. Installation costs of wiring could range from $50 to $100 per foot, including labor. Also, as wires age, they can crack or fail. It should also be noted that inspecting, testing, troubleshooting, repairing and replacing wires require time, labor and materials. With wireless systems an operator will be able to eliminate the cost associated with the abovementioned activities in addition to costs associated with downtime and production stoppage. Based on information collected from manufacturers and distributors, the capital, operational and maintenance costs associated with wireless monitors are relatively low.

Wireless monitors have been proven to be intrinsically safe and they also allow facility operators greater flexibility in the placement of monitors. This advantage over wired systems is particularly significant due to the fact that mobile equipment such as cranes are positioned at different locations of a facility during maintenance, turnarounds and other downtime activities at a refinery.

While there may be great emphasis placed on the capital and maintenance costs associated with wireless systems, it should also be noted that with improved monitoring comes the benefit of being aware of when a release occurs. This allows the operator to repair leaks in a timely manner and reduce lost product with which there is a cost-saving factor associated.

The facilities presently subject to this rule include refineries, chemical plants, oil and gas production sites, natural gas processing plants, and pipeline transfer stations. The proposed

amendments will also require facilities engaged in blending, compounding and re-refining lubricating oils and greases, as well as marine terminals that handle organic liquids to implement a LDAR program and will require enhanced monitoring of any atmospheric process PRDs that may be present. These facilities are classified under Standard Industrial Code (SIC) 2992 – Lubricating Oils and Grease Re-Refining facility that operates distillation equipment, heaters and storage tanks. Staff has determined that the operation of these equipment and the associated components, such as pumps, valves and connectors has a potential for gaseous and liquid VOC leaks and potential emissions are no different than that of other petroleum operations and chemical plants regulated by Rule 1173. Staff's analysis identified one facility, Demenno Kerdoon, located in Compton, California, as a facility that should also be regulated under this proposed amendment to Rule 1173.

A total of twelve marine terminals that are operated by ten companies have been identified as well. These facilities are classified under Standard Industrial Codes (SIC) 4226 and 5171 – A Facility, Equipment or Structure constructed to handle the loading or unloading of organic liquid in or out of marine tank vessels. Staff has also determined that the operations carried out at marine terminals and the associated components have the potential to leak fugitive emissions as well.

EMISSION INVENTORY

The emission inventory is comprised of fugitive VOC emissions from components and from process atmospheric PRD releases. The proposed amendments will require lubricating oil and grease re-refiners and marine terminals operations to implement the LDAR program as prescribed under Rule 1173. Although an estimated inventory can be developed for PRD releases, it is difficult to estimate an emission reduction from an enhanced PRD monitoring program. Therefore, staff will only analyze the additional VOC emissions and emission reductions from the additional proposed source categories (re-refiners and marine terminals) to be regulated under Rule 1173 and those from PRD releases. There will be no emissions or inventory estimates associated with the enhanced PRD monitoring provisions of the proposal.

Table 2.1
New Sources added to Rule 1173

Oil and Gas Re-Refiner	**AQMD ID#**
Demenno Kerdoon	800037
Marine Terminal	**AQMD ID#**
BP West Coast Terminal 1	132137
BP West Coast Terminal 2	800052
Valero Refining (Ultramar)	800198
Equilon (Shell) LLC	117560
Equilon (Shell) Long Beach	117319
ExxonMobil	800092
ConocoPhillips	111642
Westway	110924
General Petroleum	108417
Vopak	800040
Amerigas	111896
Jankovich	1971

A. VOC Emissions from Components

The emission inventory for fugitive VOC emissions from components was established based on reported emissions by the lubricating oil and grease re-refiner and marine terminals in the Rule 1173 universe for the fiscal year 2003-2004 and the 2003 AQMP. Currently, as part of the AER

program, facilities are required to report fugitive VOC emissions for specific component categories such as components in light liquid/gas/vapor (light liquid) service and fugitive VOC emissions from pumps and valves in heavy liquid service. Fugitive VOC emissions from other components not explicitly listed in the AER such as connectors, hatches, sight glasses and meters) are to be reported under the "other" category.

Table 2.2
2003-04 Reported Emissions

Component	Inventory	2003-2004 Emissions TPY
Heavy Liquid Valves	3,041	6.64
Heavy Liquid Pumps	120	24.16
Heavy Liquid Connectors	1,828	7.08
Other Components in Heavy Liquid	5,107	18.40
Light Liquid Valves	3,712	125.45
Light Liquid Pumps	98	25.04
Light Liquid Connectors	2,409	7.30
Other Components in Light Liquid Service	7,193	18.4
Total	**23,508**	**232.47**

After review of annual emissions reported by marine terminals, staff has determined that these emissions appear to be based on emission factors associated with a LDAR program as required by the current rule. While the use of lower emission factors may be appropriate for those facilities that are voluntarily implementing a LDAR program as specified in Rule 1173, it is not appropriate for most other facilities that are not fully implementing the program. Therefore, staff has elected to estimate annual emissions by using AQMD default factors until the reported emission reductions can be verified.

B. Emission Inventory from Process Atmospheric PRDs

Releases from atmospheric PRDs occur randomly and therefore, an accurate inventory of emissions from this source category can only be approximated. Table 2.3 - Atmospheric PRD Inventory lists the number of atmospheric PRDs installed on process equipment at refineries.

Table 2.3
Atmospheric PRD Inventory

Atmospheric PRD Inventory	No. of Atmospheric Process PRDs (1)	
	In Gas/Vapor Service	In Liquid Service
BP West Coast Products	387	205
Chevron	49 (2)	0
ConocoPhillips, Carson	15	0
ConocoPhillips, Wilmington	8	0
Edgington	14	0
ExxonMobil	35	0
Lundy Thagard	9	0
Equilon (Shell Oil)	40	0
Valero	8	0
TOTAL	**565**	**205**

(1): Reported by refineries in 2005
(2): 9 of 49 PRDs have been equipped with electronic valve monitoring devices; one more will be added at next turnaround

Since 2003, Rule 1173 requires refineries and chemical plants to report releases from PRDs to the AQMD within 30 days of the event. Table 2.4 is a summary of atmospheric PRD releases from process equipment for the calendar years 2003 through 2006. The data is presented in a format to coincide with reporting and action requirements of the rule. Rule 1173 requires refineries with over 20,000 barrels per day crude oil throughput to connect all PRDs serving that equipment to a vapor recovery or control system following a second release from the same PRD within five years and exceeding 500 pounds of VOC or after any release exceeding 2,000 pounds of VOC. In lieu of connecting the PRD to control, a refinery may pay a mitigation fee of $350,000. Table 2.4 also delineates PRD release data for major processing units, such as the crude distillation unit, coker unit and fluid catalytic cracking unit; staff believes these process units to have the greatest potential to experience atmospheric PRD releases.

Table 2.4
Summary of Process Atmospheric PRD Releases from 2003 - 2006

PRD Release Year	Process Unit	No. of Releases <500 lbs	VOC Emissions (lbs)	No. of Releases 500 - 2,000 lbs	VOC Emissions (lbs)	No. of Releases >2,000 lbs	VOC Emissions (lbs)	Total VOC Emissions (lbs)
2003	FCCU	0	0	2	3,096	4	158,834	
	Crude Distillation	0	0	1	1,475	2	14,612	
	Other	3	415	0	0	0	0	
	Total	**3**	**415**	**3**	**4,571**	**6**	**173,446**	**178,432**
2004	FCCU	1	4	0	0	0	0	
	Coker	1	65	1	553	1	6,004	
	Super Fractionator	1	306	1	923	0	0	
	Other	4	399	0	0	0	0	
	Total	**7**	**774**	**2**	**1,476**	**1**	**6,004**	**8,254**
2005	FCCU	1	30	0	0	0	0	
	Other	13	768	0	0	0	0	
	Total	**14**	**798**	**0**	**0**	**0**	**0**	**798**
2006	Debutanizer	0	0	1	1,668	0	0	
	Reformer Depropanizer	0	0	0	0	1	11,564	
	Reformer Suction Drum	0	0	1	713	0	0	
	Reformer Flash Drum	0	0	1	1,051	0	0	
	Other	2	338	0	0	0	0	
	Total	**2**	**338**	**3**	**3,432**	**1**	**11,564**	**15,334**

The data in Table 2.4 shows PRD releases in 2003 of more than 89 tons of VOC; reducing significantly to approximately 4 tons and 0.4 tons for years 2004 and 2005, respectively; 2006 saw an increase in PRD releases to a total of slightly more than 7.5 tons of VOC. Table 2.5 lists the significant PRD releases since the beginning of 2003 and the compliance options taken by the refineries. There were no reported significant PRD releases in 2005.

Table 2.5
Summary of Process Atmospheric PRD Releases
Greater Than 500 Pounds VOC Year 2003 - 2006

PRD Release Date	Refinery	Process Unit	VOC Emissions >500 – 2,000 lbs	VOC Emissions >2,000 lbs	Comments
1/12/03	ExxonMobil	Crude Tower		9,965	Exempt – SCE Power Outage
2/18/03	Equilon	FCCU Fractionator	1,697		1st Release > 500 lbs
3/19/03	BP	FCCU Debutanizer	1,399		1st Release > 500 lbs
3/21/03	BP	FCCU Dehexanizer		122,293	Mitigation Fee - $350,000
5/3/03	Equilon	FCCU Fractionator		11,854	Mitigation Fee - $350,000 (2nd release from same unit)
7/23/03	Conoco Phillips	Secondary Crude Column	1,475		1st Release > 500 lbs
10/18/03	Equilon	FCCU Fractionator		21,591	Mitigation Fee - $350,000 (3rd release from same unit)
11/2/03	BP	Crude Tower		4,647	Mitigation Fee - $350,000
12/15/03	Equilon	FCCU Fractionator		3,096	Mitigation Fee - $350,000 (4th release same unit)
1/18/04	BP	Coker Area DEA	553		1st Release > 500 lbs
9/28/04	BP	Super Fractionator	923		1st Release > 500 lbs
11/23/04	BP	Coker Debutanizer		6,004	Connect to Vapor Recover System
2/13/05	BP	#1 Reformer Desulfurizater	825		Faulty pressure transmitters replaced. 1st release > 500 lbs

PRD Release Date	Refinery	Process Unit	VOC Emissions >500 – 2,000 lbs	VOC Emissions >2,000 lbs	Comments
2/19/06	BP	#3 Debutanizer	1,668		1st Release > 500 lbs
3/6/06	BP	#2 Reformer LPG Compressor Suction Drum	713		1st Release > 500 lbs
7/21/06	BP	#3 Reformer Flash Drum	1,051		1st Release > 500 lbs
12/5/06	BP	#2 Reformer Straight Run Depropanizer		11,564	Mitigation Fee - $350,000

CONTROL TECHNOLOGY ASSESSMENT

In this chapter, control techniques for reducing fugitive emissions from atmospheric PRDs and components are described. A relatively new wireless technology that is used specifically to continuously monitor atmospheric PRDs will be discussed at length. In addition, the implementation of the LDAR program and modification and replacement of existing components will also be discussed.

A. ELECTRONIC VALVE MONITORING DEVICES FOR ATMOSPHERIC PRDs

PRDs are designed to relieve pressure and provide safe operations. They typically function by opening at a given set pressure, venting and then resealing when a safe pressure has been re-established. In addition to the environmental concern resulting from emissions releases, any consistent leak through a PRD represents a loss of valuable process gas.

Without continuous monitoring and diagnostic instrumentation, PRDs are normally placed on a preventative maintenance schedule with inspections being done on scheduled intervals based on operating history. This practice results in repair of valves that may not be broken and a cost associated such maintenance.

Wireless Instrument technology was chosen by one refinery based on the fact that operators were given the option in the 2002 amendment of the rule to install tamper proof electronic valve monitoring devices on 20 percent of their atmospheric PRDs. The 20 percent strategy was chosen to allow the technology to be tested and further developed over a period of time for this particular industrial application.

Wireless Instrument Network Integration to Existing Plant Systems

First Generation:

The initial form of wireless systems for industry has mostly used cellular phone style radio links, using point-to-point or point-to-multipoint transmission. The Wireless Instrumentation products contain a radio transmission link that connects the wireless instrument field unit (acoustic or pressure) to a base radio. This link is designed to serve in industrial applications for reliable transmission and receipt of sensor data.

The wireless field monitoring unit relays the status of valves back to a central base-radio where the emergency station location is tagged and identified. The base radios are designed to accommodate a networked installation, with each base radio defining a wireless cell and each wireless instrument field unit becoming a node in that cell. The size of each cell is determined by the effective transmission distance of the radio link between the base-radio and the various wireless instruments.

Depending on the brand of monitoring equipment each base radio may monitor up to 50 or more valves. The network can be expanded to a total of as many as 16 base radios covering various operating units and providing the capability to continuously monitor up to 800 points.

Second Generation (Mesh Network System):

Mesh Network is a new technology in which devices assist each other in transmitting packets through the network, especially in adverse conditions and where there are obstructions. The mesh network system is a point-to-point-to-point system. A node can send and receive messages, as well as function as a router capable of relaying messages for its neighbors. A mesh network offers multiple redundant communication paths throughout the network. If one link fails for any reason, the network automatically routes messages through alternate paths and hence eliminates possible line of sight obstacles.

A wireless mesh network system may require an extensive survey of the facility site in order to determine the proper positioning of the sensor units. One mesh technology wireless manufacturer has set July 1, 2007 for its first production shipment, while another has installed more than 20 units at a local refinery (atmospheric PRDs) and is in the process of testing them. It should also be noted that first generation wireless systems can be integrated into second generation wireless systems and there should be no significant added costs in incorporating a point-to-point system into a mesh network system.

Components of Wireless Pressure Relief Device Monitoring System Technology

New (wireless) technology allows continuous monitoring of PRDs without significant capital expense and makes it easy for operators to identify valve leaks, even if they discharge into a common exhaust or flare header. VOCs that are emitted from PRDs may be accurately identified, estimated, remedied and reported immediately, thereby removing the need for unnecessary preventative maintenance procedures and emission releases.

Acoustic (Sensor) Field Unit

Recently, technology has been introduced that enables continuous monitoring of PRDs using sensors that can communicate through a wireless radio link to a central data collection point. The new self-contained Monitoring Field Unit includes an acoustic sensor element and a transceiver providing two-way communications and operating in the 900 MHz band with battery life that could be as long as five years depending on the manufacturer. During normal operations, a PRD remains closed until a specified amount of pressure builds up within the system. Once the pressure exceeds a certain safety limit, the PRD opens until pressure drops below the safety limit. During that the time that the valve is open ultrasound is generated. The Acoustic Field Unit can effectively measure the duration of the overpressure event. If a PRD is leaking ultrasound will be generated and rise in proportion to the flow rate and pressure

The non-invasive installation of an acoustic sensor coupled with wireless transmission of data on the PRD operation provides an easy and inexpensive monitoring solution when compared to hard-wired systems. Also, built into the system is a Frequency-Hopping Spread System (FHSS) which is a frequency modulation process that eliminates unauthorized interception.

Typically, an industrial environment is noisy by nature and noise activity can be continuous or intermittent. However, noise activity that is created by valve leakage can be distinguished by employing filters of ultrasonic magnitude and duration.

The acoustic unit is fairly maintenance free and is operated on a "C" size lithium battery that has a life of up to five years and remaining battery life may be one of the outputs from this unit for some manufacturers. The unit contains extensive self-checking software and hardware that continuously monitors the operation. Any sensor or device parameter that is out of specification is identified and reported.

Pressure (Sensor) Field Unit

Wireless pressure sensors can be applied either on the inlet (upstream) or outlet (downstream) of a PRD. The pressure field unit is available in gauge pressure or absolute pressure versions. Each is self-powered and contains a pressure sensor, signal conditioning circuitry and an RF (radio frequency) transceiver that operates in a certain waveband that is normally license-free. Data from the sensor is transmitted to the Base Radio for centralized monitoring and data acquisition. Most manufacturers have distinct models that are designed to operate within certain ranges of pressure. The field units can be used for conditions as low as 30 psig to 5,000 psig based on manufacturer's information provided.

The advantages of using pressure sensors over acoustic sensors include the positive verification of actual system pressure and the elimination of the need to filter background noise from the monitoring data. Wireless pressure sensing also provides positive indication of release events as well as time stamps and duration. However, the downside of pressure sensing is its inability to detect leakage effectively. This problem is most likely to exist in situations where flow rates are very high and turbulence occurs and it is common to have high ambient levels of ultrasound.

Differential Pressure (Sensor) Field Unit

This unit comes is equipped with an integrated differential pressure sensor, signal conditioning circuitry and an RF (radio frequency) transceiver. Data from the sensor is transmitted to the base radio for centralized monitoring and data acquisition.

Base Radio

The Base Radio is at the heart of the wireless technology solution. It communicates with all of the deployed Field Units and interfaces with the existing control system. One base radio can communicate with as many as 50 field units. Multiple based radios can be used to accommodate larger installations. The base radio comes in an explosion-proof and weatherproof housing. Depending on the layout of a facility which will determine whether there is clear line of sight or not, the range of field units may be between 500 feet and 3,000 feet.

Electronic valve monitoring devices are designed for pressure relief valve monitoring. The devices quantify information about overpressure events and detect potentially unsafe or undesirable pressure relief valve conditions. The device calculates flow through the valve and records the date, time and event duration. The data can be retrieved from the device, at any time, with PC software.

B. IMPLEMENTING A LEAK DETECTION AND REPAIR (LDAR) PROGRAM

Rule 1173 requires petroleum related facilities and chemical plants to implement a LDAR program to reduce fugitive VOC releases. The LDAR program is best suited to pumps, valves and connectors where repairs of these components could result in potentially significant VOC emission reductions. Facilities that are included in this amendment of Rule 1173 will be subject to an LDAR program which is outlined in the rule and is defined by the following: (1) component identification; (2) leak thresholds; (3) inspection frequencies and (4) repair frequencies.

The facility operator is required to visibly and clearly identify all major components for the purpose of recording repairs, replacements and re-inspections. In the event that there are changes in major component identification the operator must seek the approval of the Executive Officer.

The rule amendment defines leak limits based on either an instantaneous standard or a continuous 24-hour standard.

Inspections are a critical component of the LDAR program and consist of two types. Audio-visual inspections involve direct physical observation to gather qualitative information, while quantitative inspections involve a direct measurement of components by use of an analyzer using EPA Method 21.

All accessible pumps, compressors and atmospheric PRDs are required to be audio-visually inspected once during every 8-hour operating period. The operator must also conduct EPA Method 21 quarterly inspections of all accessible components in light liquid/gas/vapor service and pumps in heavy liquid service, while all inaccessible components in light liquid/gas/vapor service require EPA Method 21 inspections annually. Provided an operator successfully operates and maintains all accessible components at a facility for five consecutive quarters based on a schedule that is outlined in the rule language, he/she may request for a change in inspection frequency from quarterly to annual. If a facility has more than 25,000 components the operator is required to simultaneously record all component inspections in an electronic format.

Time periods for component repairs depend on the type of leak and may vary from one day to seven days from the time a leak is detected according to a repair schedule outlined in the rule language. After a component has been repaired, the operator must conduct an inspection within one o 30 calendar days depending on the component and service type. In the case of an atmospheric PRD release an inspection must be done within one calendar day of repair and a re-inspection within 14 calendar days. Components found to be subjected to five or more repairs within a 12-month period must be replaced or vented to an air pollution control device upon approval by the Executive Officer.

RULE PROPOSAL

Proposed Amended Rule (PAR) 1173 will add two new facility groups that were not included in the rule when it was last amended in December 2002. The current version of Rule 1173 addresses control of VOC leaks and releases from components at petroleum facilities and chemical plants. PAR 1173 will require a LDAR program to reduce leaks and releases from components at lubricating oil and grease re-refineries which are engaged in blending, compounding and re-refining lubricating oils and greases from purchased mineral, animal and vegetable materials as defined in Standard Industrial Classification Code 2992. PAR 1173 will also require a LDAR program to reduce fugitive releases from components at marine terminals that handle organic liquids.

A definition of Lubricating Oil and Grease Re-Refiners has been added.

Among the issues addressed in the previous amendment of Rule 1173 was the monitoring of VOC releases from atmospheric process PRDs at petroleum refineries. The operator was provided with three options that would allow the operator to monitor the PRD and estimate the duration of any releases. One option required PRDs to be monitored by use of electronic process control instrumentation to monitor certain process parameters such as temperature and pressure. In cases where operators did not have the capability of electronic process control, they were allowed to use telltale indicators to detect when a release occurred although this option does not allow for very accurate quantification of VOC releases. The third option required that twenty percent of the atmospheric process PRDs be equipped with tamper-proof electronic monitoring devices.

Since the last rule amendment, electronic valve monitoring technology has improved and a larger number of companies have become involved in the manufacturing and distribution of wireless equipment that can be used for atmospheric PRD monitoring. With that development and the low cost and ease of installation staff has determined that all atmospheric PRDs should be equipped with electronic monitoring devices unless it can be demonstrated to the satisfaction of the Executive Officer that installation of this type of monitor is not feasible for a specific PRD. In that case, process monitoring or telltale indicators would be required. However, situations where tamper proof electronic monitoring device cannot be used are few, if any.

For a petroleum facility with less than 50 atmospheric process PRDs, an operator will be required to install tamper proof electronic monitoring devices on all inaccessible atmospheric process PRDs and on a minimum of 50 percent of all accessible atmospheric process PRDs by July 1, 2008. By July 1, 2009, the remaining accessible atmospheric PRDs serving process equipment will have to be equipped with tamper proof electronic monitoring devices.

Petroleum facilities that have more than 50 atmospheric PRDs must install tamper proof electronic monitoring devices on all inaccessible atmospheric process PRDs and on a minimum of 20 percent of all accessible atmospheric PRDs serving process equipment by July 1, 2008. By July 1, 2009 a minimum of 40 percent of all accessible atmospheric PRDs must be equipped with tamper proof electronic monitoring devices. All remaining accessible atmospheric PRDs serving process equipment must have electronic monitoring devices installed by July 1, 2010.

During the period of time prior to refineries installing tamper proof electronic monitoring on all atmospheric process PRDs, operators will be required to continue monitoring these PRDs with the existing electronic process control instrumentation that allows for real time continuous parameter monitoring or telltale indicators.

Petroleum facilities that can demonstrate to the satisfaction of the Executive Officer that installation of tamper proof electronic valve monitoring devices on process unit PRD(s) by the specified dates would be infeasible or constitute a safety hazard may be allowed to delay installation of these devices on the PRD(s) until no later than the next scheduled turnaround of that process unit.

PAR 1173 requires that all petroleum facilities install and operate tamper proof electronic monitoring devices that are capable of measuring the duration of each PRD release and quantifying the amount of VOC released from each atmospheric process PRD. However, if a petroleum facility chooses to adopt an alternative approach that includes the use of process parameter monitoring, the operator will be required to install a tamper proof electronic monitoring device at the PRD release point (on the process unit) that is capable of accurately measuring the release duration and use continuous process parameter monitoring to quantify the VOC release. The use of any such alternative approach will require that the operator demonstrate, to the satisfaction of the Executive Officer, that continuous parameter monitoring of the process unit accurately represents the actual process conditions at the location of the PRD release to the atmosphere.

A petroleum facility will not be required to install tamper proof electronic valve monitoring devices on atmospheric PRDs that release to drains and are subject to the requirements of Rule 1176, if the operator can demonstrate to the satisfaction of the Executive Officer that all released material remains in liquid state under atmospheric conditions.

In order to provide the AQMD with a comprehensive status update on its atmospheric PRDs, operators at all facilities subject to Rule 1173 must submit a revised compliance plan by December 31, 2007. This update must include a process atmospheric PRD inventory, pressure set point, size, location and the option selected for PRD monitoring.

Lubricating oil and grease re-refiners and marine terminals will be required to monitor all process atmospheric PRDs using the aforementioned combination of electronic monitors and real time process parameter monitoring and telltale indicators. By December 31, 2007, an operator will be required to submit a compliance plan that contains the process atmospheric PRD inventory, pressure set point, size, location and the option selected for monitoring. Monitoring of process atmospheric PRDs is to commence no later than July 1, 2008.

Lubricating oil and grease re-refiners and marine terminals will be required to notify the Executive Officer within one hour of release followed by a written report within 30 days for all process atmospheric PRD releases in excess of 100 pounds of VOC or in excess of reportable quantity limits as stipulated in 40 CFR, Part 117 (Determination of Reportable Quantities for Hazardous Substances) Subchapter D – Water Program, Part 302 (Designation, Reportable Quantities and Notification) and Part 355 (Emergency Planning and Notification) Subchapter J – Superfund, Emergency Planning and Community Right to Know. The written report following

the release must include information such PRD type, size and location; the cause, date, time and duration of each release, in addition to corrective actions taken to prevent a subsequent release.

All operators of facilities included in this rule amendment are required to submit quarterly electronic reports for all process atmospheric PRDs indicating the process parameter(s) monitored as a function of time. These reports are required to be submitted no later than 30 days after the end of each calendar quarter.

EMISSION IMPACTS

A. LDAR PROGRAM FOR LUBRICATING OIL AND GREASE RE-REFINERS

Currently, there is no rule requirement in place for an inspection and maintenance program for components in heavy and light liquid service at lubricating oil and grease re-refiners and marine terminals. Including these components in a LDAR program can reduce these VOC emissions at this source category. As of January 1, 2007, one lubricating oil and grease re-refiner, Demenno Kerdoon, has initiated implementation of a LDAR program as required under Rule 1173 as part of a settlement agreement in June 2006 with the AQMD.

In order to establish the emission impacts of the rule, it is necessary to calculate the emission reductions associated with a LDAR program. Per AQMD Rule 301, affected facilities are required to report all fugitive emissions in the Annual Emission Report on forms R3, T1 or P1. To report emissions from all components not subject to a LDAR program, default emission factors are used.

Three marine terminals have already implemented a LDAR program at their facilities; the proposed amendments will not result in any additional VOC emission reductions or implementation costs for these marine terminals. The other nine marine terminals, based on the 2003-2004 AER reports they have submitted to the AQMD, indicated they have implemented a limited or screening-type LDAR program. For these nine facilities, staff will use the VOC emissions reported to the AQMD as the baseline emissions to determine additional VOC emission reductions that will be a result of the required LDAR program under the proposed amendments to Rule 1173.

Where an LDAR program is in place and monitoring of components takes place, the following methods may be used to calculate emissions:

- The Correlation Equation and Factor Method, or
- The Screening Value Range Method.

These methods were developed based on data in the 1995 EPA Protocol and 1997 CAPCOA Review, and apply to components that are subject to the inspection and maintenance program of Rule 1173. (Guidelines for Fugitive Emissions Calculations – Petroleum Industry, SCAQMD, June 1999).

During an inspection required by current Rule 1173, the leak rate from a component would be measured and recorded using a calibrated organic vapor analyzer, according to EPA Reference Method 21. This measured value is called a screening value, and will be used in the following equations based on the Correlation Equation and Factor Method to determine fugitive emission inventories for the types of components listed below.

The current rule requires a LDAR program for pumps in heavy liquid service and a leak threshold of 100 ppm for all components in heavy liquid service, including valves and connectors. Based on data from refineries implementing an LDAR program for heavy and light liquid components, it is assumed that pumps in heavy liquid service will average 25 ppm after the LDAR program and that valves and connectors will average 50 ppm, or half the leak threshold; light liquid and gas/vapor phase components will average 5,000 ppm, or half the leak threshold.

LDAR Emission Calculations for Components in Heavy and Light Liquid Service for Refineries and Marine Terminals (per Table IV-3a; CAPCOA-Revised 1995 Correlation Equations and Factors)

Valves:

Fugitive emissions (TPY) = $5 \times 10^{(-6)} \times 24 \times 365 \times (\text{Screening Value})^{0.747}$

Pumps:

Fugitive emissions (TPY) = $1.12 \times 10^{(-4)} \times 24 \times 365 \times (\text{Screening Value})^{0.622}$

Connectors:

Fugitive emissions (TPY) = $3.37 \times 10^{(-6)} \times 24 \times 365 \times (\text{Screening Value})^{0.736}$

Other Components:

Fugitive emissions (TPY) = $1.92 \times 10^{(-5)} \times 24 \times 365 \times (\text{Screening Value})^{0.642}$

SAMPLE CALCULATIONS

Projected emissions from valves in heavy liquid service at 50 ppm average, calculated with the valve correlation equation, are:

$\text{Emissions}_{\text{valves}} = 3{,}041 \times [5 \times 10^{-6} \times (50)^{0.747}]$ lb/hr x 24 hrs/day x 365 days/yr /2000 lb/ton

= 1.24 TPY (See Column 3 of Table 5.1)

Projected emissions from pumps in heavy liquid service at 25 ppm average, calculated with the pump correlation equation, are:

$\text{Emissions}_{\text{pumps}} = 120 \times [1.12 \times 10^{-4} \times (25)^{0.622}]$ lb/hr x 24 hr/day x 365 days/yr / 2000 lb/ton

= 0.44 TPY

Projected emissions from connectors in heavy liquid service at 50 ppm average, calculated with the connector correlation equation, are:

$\text{Emissions}_{\text{conn.}} = 1{,}828 \times [3.37 \times 10^{-6} \times (50)^{0.736}]$ lb/hr x 24 hrs/day x 365 days/yr / 2000 lb/ton

= 0.48 TPY

Projected emissions from other components in heavy liquid service at 50 ppm average, calculated with the correlation equation used for other components are:

$\text{Emissions}_{\text{other}} = 5{,}107 \times [1.92 \times 10^{-5} \times (50)^{0.642}]$ lb/hr x 24 hrs/day x 365 days/yr/ 2000 lb/ton

= 5.29 TPY

Table 5.1
Estimated Emission Reductions

Component	Inventory	2003-2004 Emissions TPY	Emissions after LDAR TPY	Emissions Reduction TPY
Heavy Liquid Valves	3041	6.64	1.24	5.40
Heavy Liquid Pumps	120	24.16	0.44	23.72
Heavy Liquid Connectors[1]	1,828	7.08	0.48	6.60
Heavy Liquid (Others)	5,107	18.40	5.29	13.11
Light Liquid Valves	3,712	125.45	47.12	78.33
Light Liquid Pumps	98	25.04	9.61	15.43
Light Liquid Connectors[2]	2,409	7.3	18.76	(0)[3]
Light Liquid (Others)	7,193	18.4	143.36	(0)[3]
Total	**23,508**	**232.47**	**226.30**	**142.59**

1. The number of connectors is assumed to be 25 % of components (connectors, sight-glasses, meters and hatches) reported in the other category of AQMD AER form R3. The remaining components were placed in to the "Others" category
2. When not reported, the ratio of connectors in heavy liquid to light liquid service was estimated based on the ratio of valves in heavy liquid to light liquid service.
   In cases where enough information was not provided, components in heavy liquid and light liquid were divided evenly
3. Emissions reported were found to be less than the computed LDAR emissions and zero default will be used until the calculation methods used by the marine terminals are verified

Staff is aware that a few impacted facilities are voluntarily implementing a LDAR program and, therefore, a portion of the estimated emission reductions may have already been realized. Although PAR 1173 would make these reductions enforceable, staff intends to work with impacted facilities to verify the scope of the LDAR program being implemented voluntarily, and to the extent warranted, adjust the emission reduction estimated and cost analysis accordingly.

B. REQUIRE ELECTRONIC MONITORING DEVICES FOR ATMOSPHERIC PROCESS PRDs

No direct emission reduction is claimed for this requirement.

COST AND COST EFFECTIVENESS

This chapter will present the cost calculations related to PAR 1173. In the case of the LDAR program for lubricating oil and grease re-refiners and marine terminals, there are associated cost effectiveness calculations. However, in the case of atmospheric process PRDs, releases are episodic and random in nature, but are quantifiable. Potential VOC emission releases from PRDs will be subject to improved continuous monitoring, but these emission releases are not reduced by specific control equipment. Therefore, cost effectiveness calculations will not be applied to electronic monitoring.

The cost effectiveness of the proposed changes and associated calculations and assumptions used to derive it are shown in the following sections. Cost effectiveness is expressed as the ratio between the present value of the total cost of implementing a proposed control measure and the benefit of installing that control measure, which in this case is the emission reduction.

A. LDAR PROGRAM

The rule amendment will add one lubricating oil and grease re-refining facility (Demenno Kerdoon) and twelve marine terminals to the list of facilities whose operations and equipment category qualify them to be subject to the requirements of this rule. The emission inventory for these facilities is shown in Table 6.1 - Cost Effectiveness for a LDAR Program.

On January 1, 2007, Demenno Kerdoon initiated the implementation of a LDAR program as required under Rule 1173 as part of a settlement agreement met in June 2006 with the AQMD. The following analysis demonstrates the cost effectiveness to implement an LDAR program.

Three of the twelve marine terminals that are included in the Rule 1173 program are already in compliance with the requirements of the rule and therefore staff has been determined that there will be no additional cost associated with these facilities.

In order to calculate the cost effectiveness of the LDAR program, the present value of the capital cost and operating cost during the useful life of the program must be calculated using the following formula:

PV = C + A x PVF, where:

PV = Present Value of the control equipment

C = Capital costs associated with implementing the LDAR program

A = Annual costs incurred to administer the LDAR program, such as inspection and component repair

PVF = Present Value Factor, which is 8.11 for an assumed 10 years equipment life and 4% rate of inflation.

The following assumptions are made in order to calculate the present value for the LDAR program of components in heavy and light liquid service:

- Quarterly inspection frequency for components
- Emission reductions for pumps are based on an average emission of 25 ppm based on data from a refinery that has a LDAR program.
- Emission reductions for valves and connectors are based on an average emission of 50 ppm base on AQMD staff field survey.
- Inspection cost per component is $2 (Per AQMD Rule 1173 Staff Report, December 2002)
- Average repair time is 4 hours per pump
- Average repair time for valves = 10 minutes
- Average repair time for connectors = 20 minutes
- Average repair time for other components = 1 hr
- All components need tags
- Tagging a component takes 5 minutes and the cost of a tag is $2
- Components inventory is entered in the database at 0.25 minutes per component and labor cost for data entry is $20/hr
- Repair labor costs are $30 per hour
- Equipment useful life is 10 years.

The cost effectiveness of the LDAR program will be calculated using the emission reductions calculated in Chapter V and under the assumptions mentioned above. Table 6.1 - Cost Effectiveness for LDAR Program shows the cost effectiveness for the proposed LDAR program.

TABLE 6.1
Cost Effectiveness for LDAR Program

Number of Components	**Valves**	**Pumps**	**Connectors[1]**	**Others**	**Total**
Heavy Liquid Service Light Liquid Service	3,041 3,712	120 98	1,828 2,409	5,107 7,193	**23,508**
Capital costs ($) (Tags, tagging, data entry)	30,951	999	19,420	56,375	107,745
Annual Costs ($) (Monitoring and repair)[2]	30,371	8,284	20,119	64,924	123,699
Emission Reduction (TPD)					142.59
Cost-Effectiveness ($/ton)					**779**

1: The number of connectors is assumed to be 30 % of components (connectors, sight-glasses, meters, etc.) reported in the other category of AQMD AER form R3
2. Monitoring of all light liquid and gas/vapor valves and components and heavy liquid pumps quarterly
3. Emission reductions for valves, pumps and connectors are calculated based on reported AER values
4. BP Terminals 1 and 2 and Valero are already meeting the requirements of Rule 1173 and would not incur any additional costs

$$\text{Cost effectiveness} = \frac{\text{Present Value}}{\text{Emission Reduction x Equipment Life}}$$

$$= \frac{107{,}745 + (123{,}699 \times 8.11)}{142.59 \times 10}$$

= $779 per ton of VOC emissions

B. ELECTRONIC MONITORING DEVICES FOR ATMOSPHERIC PROCESS PRDs

There is no emission reduction associated with this requirement of the rule. Therefore, cost effectiveness is not calculated. Based on Compliance Plan data reported to the AQMD by the refineries as of 2005 there are 565 pressure relief valves on process equipment in gas service and venting to atmosphere. There were also another 205 pressure relief valves in liquid service venting to grade or drain with telltales. Based on wireless industry information, the total cost of equipment and installation of electronic monitoring devices for the 555 (565 less 10 already installed by one facility) pressure relief devices is estimated at $2.8 million (assuming $5,000 per device parts, labor and maintenance).

C. PARAMETER MONITORING, OR USE OF TELLTALE INDICATORS IF ELECTRONIC MONITORING NOT FEASIBLE, FOR ALL ATMOSPHERIC PROCESS PRDs

There is no emission reduction associated with this requirement of the rule. Therefore, cost effectiveness is not calculated. In most cases, at affected facilities, the process is controlled by computer systems that continuously monitor process parameters such as pressure, temperature, flow rates, etc. Daily parameter trends can be used to determine whether a release from the process equipment has occurred or not. Therefore, there is no cost involved with this requirement for those facilities equipped with process parameter monitoring systems.

At facilities where process equipment is not controlled by a computer system and parameter monitoring is not available, the use of telltale indicators that would readily indicate a release is required. However, the cost associated with these indicators is expected to be minimal.

DRAFT FINDINGS

Health and Safety Code Section 40727 requires that prior to adopting, amending or repealing a rule or regulation, the AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the hearing.

Necessity - The AQMD Governing Board has determined that a need exists to amend Rule 1173 for the following reason: to implement Control Measure FUG-05 – Emission Reductions from Fugitive VOC Sources of the 2003 Air Quality Management Plan (AQMP) and to reduce PRD releases by implementing an enhanced monitoring program.

Authority - The AQMD Governing Board obtains its authority to adopt, amend or repeal rules and regulations from California Health and Safety Code Sections 39002, 40000, 40001, 40440, 40702 and 41508.

Clarity - The AQMD Governing Board has determined that Rule 1173, as proposed to be amended, is written or displayed so that its meaning can be easily understood by the persons directly affected by it.

Consistency - The AQMD Governing Board has determined that Rule 1173, as proposed to be amended, is in harmony with and not in conflict with or contradictory to, existing statutes, court decisions or state or federal regulations.

Non Duplication - The AQMD Governing Board has determined that Rule 1173, as proposed to be amended, does not impose the same requirements as any existing state or federal regulations, and the amendments are necessary and proper to execute the powers and duties granted to, and imposed upon, the AQMD.

Reference - The AQMD Governing Board by adopting this regulation is implementing, interpreting or making specific the provisions of: Health and Safety Code Sections 40001 (rules to achieve ambient air quality standards), 40440(a), (rules to carry out the Air Quality Management Plan), (b) (Best Available Reftrofit Control Technology), and (c) (rules which are also cost-effective and efficient), 40702 (rules to execute duties necessary to preserve original intent of rule) and 40910 et seq., (California Clean Air Act).

CALIFORNIA ENVIRONMENTAL QUALITY ACT

The AQMD will prepare appropriate California Environmental Quality Act (CEQA) documentation for the proposed amendments to Rule 1173. Upon completion, the CEQA document will be released for public review and comment, and will be available at AQMD Headquarters, by calling the AQMD Public Information Center at (909) 396-2039, or by accessing AQMD's CEQA website at: www.aqmd.gov/ceqa.

COMPARATIVE ANALYSIS

Pursuant to Health and Safety Code Section 40727.7 staff has prepared an analysis of existing or proposed AQMD rules, regulations, requirements and federal air pollution control measures that apply to the same source type.

Comparison of PAR 1173 and 40CFR60 VV, GGG, KKK and 40CFR63CC

PAR 1173	40CFR60 VV, GGG, KKK, 40CFR63
Applicability	
Components at petroleum facilities, chemical plants, oil and gas production fields, natural gas processing plants and pipeline transfer stations.	Affected equipment in petroleum refineries, synthetic organic chemicals manufacturing facilities, onshore natural gas processing plants.
Requirements	
LDAR program for components in light liquid/gas/vapor service and pumps in heavy liquid service. Quarterly inspections with annual option after 5 quarters based on certain leak criteria. Inaccessible components inspected yearly.	Pumps and valves inspected monthly. Valves in light liquid/gas/vapor service inspected monthly. After two monthly inspections without leaks, they may be inspected quarterly until a leak is detected.
Leak threshold at 100 ppm for components in heavy liquid service.	Leak threshold at 10,000 ppm for pumps and valves in heavy liquid service.
Leak threshold at 500 ppm for components in light liquid/gas/vapor service.	Pumps, valves, PRDs and connectors in light liquid/gas/vapor service leak threshold at 10,000 ppm. Compressors required to have a seal system with barrier fluid. PRDs in gas/vapor service leak threshold at 500 ppm.
Leaks >500 but $\leq$ 10K ppm - seven days repair. Leaks >10K but $\leq$ 25K ppm - 2 days repair Leaks > 25K ppm 1 day repair	Leaks > 10K ppm - 15 days repair maximum, first attempt at repair within 5 days.
Monitor all process atmospheric PRDs by use of combination of electronic monitoring devices and continuous parametric	

PAR 1173	40CFR60 VV, GGG, KKK, 40CFR63
monitoring prior to July 1, 2010. Connect to control after any release greater than 2000 pounds of VOC or after second release or subsequent release greater than 500 pounds VOC from same PRD within a 5-year period.	
Lubricating oil and grease re-refiners and marine terminals must physically identify (tag) components and submit a compliance plan showing the location of the regulated components and comply with all other requirements commencing January 1, 2008.	
Recordkeeping and Reporting	
All leaks, repairs and re-inspections records to be submitted in electronic form as quarterly or annual report to AQMD.	Submit semiannual reports containing the number of components, by type, that were repaired and for which repair was delayed, and the reason for delay.
Report all releases exceeding 100 pounds VOC within 1 hour. Submit a written report within 30 days from the release.	
Submit quarterly PRD monitoring reports.	
Test Methods	
U.S. EPA Method 21 for leak screening, ASTM Method D86 for VOC content of light liquids and heavy liquids, ASTM Method D1945 for VOC content of gases, ASTM Method D93 for flash point of heavy liquids.	U.S. EPA Method 21 for leak screening, ASTM E-260, E-168, E-169 for the VOC content, ASTM Method D-2879 for the vapor pressure.
Exemptions	
Components that present a safety hazard	Components that present a safety hazard

PAR 1173	40CFR60 VV, GGG, KKK, 40CFR63
Components handling exclusively natural gas	
Components handling gases with 10 percent VOC by weight or less and liquids with less than 10% VOC by weight and a flash point greater than 250^0 F.	Components handling fluids with less than 10% by weight VOC.
Components operating under negative pressure or totally enclosed, components buried underground.	Components operating under negative pressure, pumps with a closed vent system, PRDs vented to a control device.
Pressure vacuum valves on storage tanks.	
PRDs installed for thermal protection of liquid lines provided they are vented to a drain or back in the line.	
Components handling liquids with a flash point greater than 250^0 F.	
Releases caused by natural disasters, acts of terrorism and events beyond the petroleum facility's control.	
Lubricating oil and grease re-refiners and marine terminals will not be subject to the requirements of the rule, except for the component identification and the PRD compliance plan submittal requirements until after December 31, 2007.	